Assignment 2

Saturday, October 15, 2022 2:46 PM

Assignment 2

Before reading the following, make sure to watch the screencast "Assignment 2 preview and instructions".

- Download the zipped folder "Assignment 2.zip" and save to your computer. In order for the grader file to work properly, *both your solution file and the grader file(s) must be on your computer's hard drive and NOT in the cloud* (e.g., OneDrive will not work). Then, extract the files (right click and "Extract All"). This folder contains the starter file for Assignment 2 as well as the grader file for Assignment 2.

IMPORTANT: All subroutines (macros) and functions must be named exactly as indicated in the problem statement(s). Otherwise, the grading file will not recognize your procedures. For each assignment, I have placed one or more starter files that contain the **Sub/End Sub** or **Function/End Function** with the correct procedure names.

- **Problem Statement**

  INSTRUCTIONS: Create TWO OF the following three user-defined functions. The starter file contains “skeleton” code (the **Function/End Function** statements) for the three functions – you just need to complete TWO of these. **IMPORTANT: The two functions that you complete must be in the same file (i.e., don't create two separate files, one with each function you solve)!** Start with the starter file and fill in code for two of the three functions.

Option A: The Antoine equation allows one to predict the vapor pressure (P_vap, mm Hg) as a function of temperature (T, in Celsius):

$$P_{vap} = 10^{A-\frac{B}{T+C}}$$

- In the Antoine equation, **A**, **B**, and **C** are constants that you can look up in various references. For example, for methanol these Antoine coefficients are: **A = 8.08097, B = 1582.271, C = 239.726**.

Create a VBA function named **antoine(A,B,C,T)** with arguments for the Antoine coefficients and temperature.

To check your answer, the vapor pressure of methanol at 50℃ (Antoine coefficients above) is 416.6 mm Hg.

Option B: When a bolus dose of drug is delivered to the stomach (e.g., from a pill), the concentration of drug in the stomach as a function of t is given by:

$$C(t) = C_0 \cdot e^{-kt}$$

- where **C_0** is the initial concentration (mg/L), **t** is time (in hours), and **k** is the rate constant of elimination (units of 1/hr).

Create a VBA function called **medication(C0,k,t)** that will output the concentration of drug after time t and has arguments for C_0, k, and time.

To check your answer, if the initial concentration of drug is 200 mg/L and k = 0.5/hr, there will be a concentration of 27 mg/L after t = 4 hrs.

HINT: THERE IS A BUILT-IN VBA FUNCTION "Exp" THAT YOU CAN USE. SINCE VBA HAS A BUILT-IN EXPONENTIAL FUNCTION, IT WON'T LET YOU BORROW EXCEL'S "EXP" FUNCTION. For more about the exponential function, you can see here.

Option C: When a loan of principal amount, **P**, is taken at an annual interest rate **i** with a repayment period of **n** years, the following equation provides the monthly payment, A:

$$A = \frac{P \cdot \frac{i}{12}}{1 - \left(1 + \frac{i}{12}\right)^{-n \cdot 12}}$$

- Create a VBA function called **payment(P,i,n)** that will output the monthly payment (A) based on the principal, annual interest rate, and lifetime of the loan.

To check your answer, the monthly payment on a 20-year loan with principle $10,000 with an annual interest rate of 4.5% would be $63.26.

When you feel that at least 2 of the 3 functions are working properly, open up the "Assignment 2 – GRADER.xlsm" file, which will check your work. If at least 2 functions are correct, you will be provided a completion code, which you can enter into the Coursera website into the "Assignment 2 submission" quiz.